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The ALICE 3 particle identification systems

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The ALICE Collaboration has proposed a completely new apparatus, ALICE 3, for the LHC Runs 5 and 6, which will enable novel studies of the quark-gluon plasma focusing on low- p_T heavy-flavour production, including beauty hadrons, multi-charm baryons and charm-charm correlations, as well as on precise multi-differential measurements of dielectron emission to probe the mechanism of chiral-symmetry restoration and the time-evolution of the QGP temperature.

The detector consists of a large pixel-based tracking system covering eight units of pseudorapidity and including a vertex detector mounted on a retractable structure inside the beam pipe, and a comprehensive particle identification (PID) system, implementing silicon time-of-flight (TOF) detector featuring 20 ps resolution, an aerogel-based ring-imaging Cherenkov (RICH) detector, a muon identification system, and an electromagnetic calorimeter. High-purity separation of electrons with p_T as low as 60 MeV/c and up to about 3 GeV/c at midrapidity, and of hadrons over a broad momentum range is achieved by the TOF and RICH, which are arranged in barrel and end-caps for full rapidity coverage.

This contribution will present the PID subsystems conceptual design and technology options, as well as expected performance from simulation studies and first results achieved in ongoing R&D activities.

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